4.0 SPECIFIC MITIGATIONS

The next sections of this report are presented as follows: (1) Mitigation for Butte County, (2) Equipment and training needs for Arco Fire Department and costs, (3) Equipment and training needs for LRFPD, (4) Specific mitigations for Arco Fire Department and the LRFPD, and (5) Specific mitigations for Howe and Antelope Road.

As discussed in Section 3.0, the main roads within the Lost River Fire Protection District, Antelope Road to the Medicine Rock Equestrian Center, and the main Little Lost River Valley road to the Custer County line near Pass Creek Summit were driven as part of the fire risk assessment for Butte County. In developing the mitigations, fuel loads were inspected adjacent to roads and, if hazardous, the distance this hazardous fuel occurred along the road was calculated. Roads were inspected for accessibility by large firefighting equipment, surface conditions, and bridge weight limits. Equipment and training needs were assessed in consultation with the fire chiefs of Arco Fire Department and LRFPD.

4.1 Butte County

Because such a large area of Butte County remains unprotected in the event of a fire, the need exists for the county to consider forming a countywide fire protection district.

In 1943, the Idaho State legislature passed the first Fire Protection District law. Since then, the Law has been revised several times with the most comprehensive version occurring in 1994 (Idaho Statutes, 1994). The basic purpose of this law is to establish procedures for the formation, operation and dissolution of fire protection districts within the State of Idaho. In 1996, three different fire departments were consolidated to form the Teton County Fire Protection District (personal communication, Gary Henrie, 2004). Teton County serves as a model for other counties to follow.

Steps needed to form Butte County Fire Protection District (BCFPD) and requiring the cooperation of the cities of Moore, Arco, Butte City and Howe, their mayors, council members, and the general public.

- **Establish primary goals and objectives** – These goals and objectives would include but not be limited to: (1) provide upgraded and extended fire protection to everyone within the entire county, including the cities of Moore, Arco, Butte City, Howe and Antelope Road residents, (2) provide this protection at a fair and equitable rate, and (3) off-set the additional cost of fire protection by achieving a lower insurance rate for those in the fire district.
- **Secondary goals and objectives** – These goals would target specific areas that could be enhanced to provide upgraded and extended service to all in the immediate area and include but not be limited to: (1) Upgrade and/or replace select fire fighting equipment, (2) Improve specialized and general training, (3) Improve overall response times, (4) Improve the current Insurance Services Office (ISO) rating and insurance classification, and (5) Upgrade overall fire suppression capabilities.

Three additional steps required under the Fire Protection District Law to establish a fire protection district are to:

- File a petition
- Hold a Hearing
- Secure approval of residents at an election

Henrie (personal communication, 2004) recommends drafting a petition and designating the boundaries of the proposed district to include everyone in the county and cities of Butte County, Idaho. Secondly, fix the tax to run against individual assessed valuations on improvements rather than assessed valuations of real property only.

4.2 Arco Fire Department

This section describes specific equipment and training needs recommended for the Arco Fire Department.

Table 23. Arco Fire Department Existing Needs: Capital Expenses

Needs	Costs
New Building with Classroom and Training Space	$500,000
Area Bridge Weight Structural Improvements	TBD
Increased Water Pressure and Flow (System Looped)	TBD
NFPA Compliant Light Rescue Truck	$125,000
NFPA Compliant Truck Pumper	$150,000
NFPA Compliant Wildland Engine	$200,000
Port-a-Tanks	TBD

Table 24. Arco Fire Department Existing Needs: Training and Certification

Needs	Costs
Classroom/Training Facilities	$50,000
Distance Learning Opportunities	TBD
Certified Instructor Training	$2,000

Table 25. Arco Fire Department Existing Needs: Communication

Needs	Costs
Repeater	TBD
Improve Communication with the INEEL	TBD
Enhanced 911 Center	TBD

Table 26. Arco Fire Department Existing Needs: Prevention and Inspection

Needs	Costs
Computerized Records	TBD
Training Grants	TBD
Improve City Code Enforcement	TBD

Table 27. Arco Fire Department Existing Needs: Public Education

Needs	Costs
Complete FIREWISE Program	$10,000
Laptop and Projector for PowerPoint Presentations	$2,500

4.3 Lost River Fire Protection District (LRFPD)

This section describes specific equipment and training needs recommended for the Lost River Fire Protection District.

Table 28. LRFPD Existing Needs: Capital Expenses

Needs	Costs
Area Bridge Weight Structural Improvements	$10,000
Increase Water Pressure Flow in Moore	TBD
(2) 4000 gallon Port-a-tanks (drop tank)	$12,000
Equipment to use Mainlines for Water Supply	$2,500
Tender in Arco	$90,000
Additional Fire Hose Capacity	$5,000
New Brush Trucks (replace older equipment)	$200,000

Table 29. LRFPD Existing Needs: Training and Certification

Needs	Costs
Distance Learning Opportunities	TBD
Certified Fire Fighter Training	TBD
Certified Instructor Training	TBD

Table 30. LRFPD Existing Needs: Communication

Needs	Costs
Repeater	TBD
New Radios	TBD
New Dispatch System	TBD

Table 31. LRFPD Existing Needs: Prevention and Inspection

Needs	Costs
Computerized Records	TBD
Training Grants	TBD
Improve City Code Enforcement	TBD

Table 32. LRFPD Existing Needs: Public Education

Needs	Costs
Complete FIREWISE Program	$10,000
Laptop and Projector for PowerPoint Presentations	$2,500

4.3 Arco Fire Department and LRFPD Mitigation

This section describes specific fuels treatments and other recommended mitigations that would reduce the risk of hazardous fire in Butte County and increase the capacity of the Arco Fire Department and/or LRFPD to respond to fires.

1. Remove hazardous fuels for approximately one mile along the edge of Danielson Addition and Arco Heights Subdivision between structures and the wildland-urban interface using a mower or blade behind a tractor. It is recommended that this be competed at least once

each year, just prior to curing, or preferably up to three times during summer through fall months, depending on vegetation growth.

2. Remove hazardous fuels near Butte City and between the edge of road and fence line parallel to the road using a mower or blade behind a tractor (see Figure 28). Mow or otherwise reduce fuels along the following roads at least once each year, just prior to curing, or preferably up to three times during summer and fall months, depending on vegetation growth.

2700W between 2200N and 2300N	1.0 miles
2350N to 2850W	2.0 miles
2850W to 2450N	0.5 miles
2450N to Highway 20	1.5 miles
2500N along Canyon Road south to 3100N	2.0 miles
3100N to 2100N	2.5 miles
3100N to 2800W	3.0 miles
2800W to 2200N	1.0 miles
2200N to 2300N	1.0 miles
Total	**14.5 miles**

3. Upgrade all bridges to support fire-fighting equipment (see Figure 29).

4. Remove hazardous fuels near Moore and between the edge of road and fence line parallel to the road along the King Mountain Road or east boundary of the Lost River Fire Protection District. Mow or otherwise reduce fuels along 15 miles of King Mountain Road at least once each year, just prior to curing, or preferably up to three times during summer and fall months, depending on vegetation growth.
   - Estimated cost - $75 to $100 per linear mile including tractor/mower/brush hog and operator (personal communication, Mel Ellwein, Ramshorn Ranch).

5. Install a dry hydrant system and/or drafting area for engines and tenders along the Big Lost River Highway at one location northeast of Butte City (see Figure 3 – assessment area and Figure 30).
   - Cost - $750 to $1000 per hydrant including contractor labor and machine costs, 6 inch schedule 40 PVC pipe, a commercially made screen, and hydrant connector (Pohlman et al. 2003).
   - Environmental Effects – Potential impact to riparian landowner. Establish a land use agreement(s) between the landowner and the LRFPD. If required, obtain application/permit for dry fire hydrant from state and/or federal agency and county zoning coordinator. Check locations for suitability, such as water depth, composition of streambed or lake bottom, ease of digging, protection of hydrant during winter.

6. Cooperate with landowners to allow access to irrigation mainline valves. This would require a 3-4 inch valve with a fire hose connection adapted to the valve to be used with tenders and engines.

7. Contract with local water well users to provide water during fire activities.

8. Install large water storage tanks to be used where present water conditions are not adequate for large fires.

9. Recommend to Rural Electric Association and other relevant power companies to install fireproof sleeves around their wooden power poles.

10. Recommend employment of FIREWISE Educational Programs – Arco residents and residents within the LRFPD would become familiar with FIREWISE practices though education and outreach programs sponsored by the Arco Fire Department, Bureau of Land Management, and National Park Service (Hodgson 2001).

11. Use fire-blocking gel (Bartlett 2003). Provides a level of protection against radiant heat, direct flame impingement, flying brands and burning embers. Can be applied to structures, vehicles, fuel tanks, propane cylinders or any object exposed to the effects of a fire. Can by applied by homeowners using a standard garden hose.
    - Cost - $500 per 4000 square feet or for more information - (info@barricadegel.com)

12. Create Defensible Space. Defensible spaces are areas between improved property and a potential wildland fire where the combustible fuel has been removed or modified. One or more of the following can provide defensible space:

    Homes and outbuildings -
    - Water or “greenup” lawn areas
    - Pave or gravel driveways
    - Mow vegetation or disk/blade ground to bare, mineral soil out to a minimum of 50 feet
    - Remove and/or reduce vegetation immediately around buildings

    Homes and outbuildings adjacent to agriculture lands--Greenstripping, or establishing strips of fire-resistant vegetation to reduce the spread of wildfire, is an established practice on BLM lands in Idaho (Pellant 1992). Greenstripping reduces wildfire spread by disrupting fuel continuity, reducing fuel accumulations and volatility and increasing the density of plants with higher moisture content. The reduction of the overall fuel load reduces the flame lengths and heat intensity produced on the greenstrips, but the increase in annual species composition and fine fuels produces increased rates of spread. Therefore, the following characteristics are important when selecting species for greenstripping on semiarid rangelands such as Butte County: 1) adaptability to the range sites, 2) competitiveness with annual weeds, 3) ease of establishment, 4) low flammability, 5) open canopy and spacing, 6) palatability by livestock and wildlife (for efficient removal and control of litter and fine fuel buildup), and 7) resilience and re-growth capabilities.
    - Cost - $18 to $35 per acre to prepare seedbed for planting and $100 to $120 per acre for seed mix, fertilizer and yearly maintenance (personal communication - Steve Cote, NRCS).

13. Maintain survivable space at each residence:
    - Remove portions of any tree extending within 10 feet of the flue opening of any stove or chimney.
    - Clean roof surfaces and gutters of pine needles, leaves, branches, etc, regularly to avoid accumulation of flammable materials.
    - Maintain a screen constructed of non-flammable material over the flue opening of every chimney or stovepipe. Mesh openings of the screen should not exceed 1/2 inch.
    - Landscape vegetation should be spaced so that fire cannot be carried to the structure or surrounding vegetation.
    - Remove branches from trees to height of 15 feet.
    - A fuel break should be maintained around all structures and especially if residence is near a flammable fuel source (see Figure 19).
    - Dispose of stove or fireplace ashes and charcoal briquettes only after soaking them in a metal pail of water.
    - Store gasoline in an approved safety can away from occupied buildings.
    - Propane tanks should be far enough away from buildings for valves to be shut off in case of fire. Keep area clear of flammable vegetation.
    - All combustibles such as firewood, picnic tables, boats, etc. should be kept away from structures.
    - Garden hose should be connected to outlet.
    - Addressing should be indicated at all intersections and on structures.
    - All roads and driveways should be at least 16 feet in width.
    - Have fire tools handy such as: ladder long enough to reach the roof, shovel, rake and bucket for water.
    - Each home should have at least two different entrance and exit routes.

14. Practice the "zone" approach (Simmerman and Fischer 1989) at each residence
    - Clean zone – 0-3 feet from buildings, remove all combustibles (i.e. decorative bark or shrubs, stack firewood uphill or contour away from building.
    - Short surface fuels – 3-30 feet from buildings, keep grass, and all other low plants short, < 3 inches high. Isolate trees so no branches overhang roofs.
    - Tall surface fuels – 30-100 feet from buildings, uncut grasses, scattered patches of medium shrubs is acceptable, however, keep all plants less than 18 inches high.
    - Tree and tall shrub thinning and pruning – For 100 feet around all buildings, thin (remove) trees and large shrubs so there is 10 feet of open space between all crowns and tops of plants. Remove the lower branches of all trees to a minimum of 10 feet above the ground. Scattered, isolated trees may be left unpruned for landscape purposes.
    - Recommend the use of noncombustible roofing materials
    - Replace wood shingles, or
    - Apply SHINGLE SAFE Fire Retardant on Wood Shake Shingles.

15. Develop site specific MIST guidelines for your area similar to Craters of the Moon National Monument MIST guidelines discussed earlier.

16. Install a new water distribution system within the city of Arco, from East Street and up to the residential areas and hospital on the hill.

17. Install a third deep well within Arco.

18. Form a county-wide fire district (as stated in section 4.1).

19. Within Butte City, install a new water supply system capable of delivering a minimum of 1000 gallons per minute (gpm).

20. Within the Moore, upgrade fire hydrants at LDS church from 300 gpm @20psi. to 2500 gpm @20psi. and fire hydrant at the railroad and highway 93 junction from 300 gpm to 3000 gpm. This hydrant serves two large potato storage buildings.

Because noxious weeds are a large potential fire hazard, special consideration is given to then here. Idaho has hundreds of weed species, however, only 36 are designated noxious by Idaho law (Prather et al. 2002). The word "noxious" simply means deleterious, and all listed weeds are deleterious by definition.

Confirmed sitings of the following noxious weeds have been identified in Butte County (Prather et al. 2002): spotted knapweed (*Centaurea maculosa*), leafy spurge (*Euphorbia esula*), Canada thistle (*Cirsium arvense*), musk thistle (*Carduus nutans*), field bindweed (*Convolvulus arvensis*), rush skeletonweed (*Chondrilla juncea*), hoary cress (*Cardaria draba*), Russian knapweed (*Acroptilon repens*), Scotch thistle (*Onopordum acanthium*), puncture vine (*Tribulus terrestris*), black henbane (*Hyoscyamus niger*) yellow starthistle (*Centaurea solstitialis*) and yellow toadflax (*Linaria vulgaris*). Some species, such as halogeton (*Halogeton glomeratis*), and downy brome (cheatgrass) (*Bromus tectorum*), are not listed as noxious but do impact the environment. Cheatgrass has increased the extent and frequency of wildland fires in the Great Basin and Upper Columbia River Basin with significant impacts in natural and fiscal resources (Billings 1994).

The following recommended mitigations to reduce the spread of weeds pertain to all of Butte County.

Before Construction Of Fuel Breaks, Mowing, Disking Or Other Disturbance

Survey and map invasive and noxious weeds occurring on site scheduled for construction.

1. Determine infestation size and control weeds with appropriate methods (Table 28). Use a State-certified pesticide applicator for specific recommendations and chemical treatment.
2. Train equipment operator on weed issues prior to start date. This training should include:
   - Consequences of disturbance.
   - Reasons for and methods of prevention including cleaning equipment.
   - Identification of problem plants in the immediate area.
   - What to do when an invasive or noxious weed is sighted.
3. Decontaminate vehicles and equipment entering construction site to remove weed seeds and other propagules.
   - Inspect equipment before entering project area.
   - Wash equipment (if possible) to remove all plant parts including seeds and root.

- Prevent equipment from leaving site until inspections have been preformed.

4. Minimize soil disturbance.

During Construction Of Fuel Breaks, Mowing, Disking Or Other Disturbance

1. Control all infestations on construction site (Table 28).
   - Consult State-certified pesticide applicator.
2. Minimize and control vehicular traffic entering and exiting construction site, especially those within the decontamination boundaries.
   - Decontaminate vehicles, equipment, and personnel.
   - Wash (if possible) equipment to remove all plant parts.
   - Inspect vehicles, equipment, and clothing.
3. Take precautions to prevent the spread of weeds.
   - Avoid entering areas infested with weeds.
4. Minimize soil disturbance.
   - Restrict vehicles to specified pathways.
5. Conduct surveys of project area every two weeks during the growing season (April - October) to confirm weed free status or identify new weed infestations.

After Construction Of Fuel Breaks, Mowing, Disking Or Other Disturbance

1. Decontaminate all outgoing equipment before permitting them to leave.
2. Survey all disturbed areas, adjacent areas, and destination areas for noxious weeds.
   - Map infestations, critical sites, and sensitive areas.
   - Treat weeds with appropriate method in a timely fashion (Table 28).
   - Use a State-certified pesticide applicator for specific recommendations.
3. Establish native perennial vegetation in all disturbed areas and monitor for emergence of non-native species.
4. Continue to monitor construction site and treat infestations until weeds no longer appear or are controlled equal to or better than before the commencement of the project.
   - Document all monitoring and treatment of noxious weeds.

Table 33. Simplified Weed Treatments

Weed Species	Infestation Size	Likely Treatment
Black Henbane *(Hyoscyamus niger*)	Single Plant *Patch (Or multiple plants) *Large Infestation	Pull/Grub, Chemical Chemical Chemical
Canada Thistle *(Cirsium arvense*)	Single Plant Patch (Or multiple plants) Large Infestation	Chop/Mow Chemical Chemical, Combo
Cheat Grass *(Bromus tectorum*)	Single Plant Patch (Or multiple plants) Large Infestation	Does not apply Chemical, Graze Chemical, Graze, Combo
Field Bindweed *(Convolvulus arvensis*)	Single Plant Patch (Or multiple plants) Large Infestation	Pull/Grub, Chop/Mow Chemical Tillage, Chemical
Halogeton *(Halogeton glomeratus*)	Single Plant Patch (Or multiple plants) Large Infestation	Chop/Mow Chemical, Tillage Tillage, Chemical

Hoary Cress *(Cardaria draba*)	Single Plant Patch (Or multiple plants) Large Infestation	Dig Up Chemical, Tillage Tillage, Chemical
Leafy Spurge *(Euphorbia esula*)	Single Plant Patch (Or multiple plants) Large Infestation	Chemical Graze, Chemical Graze, Combo
Musk Thistle *(Carduus nutans*)	Single Plant Patch (Or multiple plants) Large Infestation	Pull/Grub Chemical Biological, Chemical
Puncture Vine *(Tribulus terrestris*)	Single Plant Patch (Or multiple plants) Large Infestation	Does not apply Chemical Biological, Chemical
Rush Skeletonweed *(Chondrilla juncea*)	Single Plant Patch (Or multiple plants) Large Infestation	Pull/Grub Tillage, Fertilize, Combo Tillage, Biological, Combo
Russian Knapweed *(Acroptilon repens*)	Single Plant Patch (Or multiple plants) Large Infestation	Pull/Grub Chemical, Tillage Chemical, Biological, Combo
Scotch Thistle *(Onopordum acanthium*)	Single Plant Patch (Or multiple plants) Large Infestation	Pull/Grub Chemical Biological, Chemical
Spotted Knapweed *(Centaurea maculosa*)	Single Plant Patch (Or multiple plants) Large Infestation	Pull/Grub, Chop/Mow Graze, Chemical Chemical, Biological, Combo
Yellow toadflax (*Linaria vulgaris*)	Single Plant Patch (Or multiple plants) Large Infestation	Pull/Grub Chemical Chemical, Biological, Combo
Yellow starthistle (*Centaurea solstitialis*)	Single Plant Patch (Or multiple plants) Large Infestation	Pull/Grub Grazing, Chemical, Tillage Biological, Chemical

*Patch is denoted as a monoculture up to ¼ acre or irregular distribution up to an acre. A large infestation is a monoculture over ¼ acre or irregular distribution over an acre or more.

In addition to the above specific mitigations, there are costs associated with ongoing training, prevention, and education efforts by the fire department. The estimates below are provided for planning purposes and only represent estimated costs (R&S Enterprise 2003).

Training:

Officer and Crew Refresher Courses	
20 participant's @ 40 Hours @ $12.00/hour	9,600
Instructor	4,000
Equipment and Materials	4,000
	$17,600
Crew Level Training - New Recruits	
Ten (20) Participants @ 40 Hours @ $12.00/hour	9,600
Instructor	4,000
Equipment and Materials	4,000
	$17,600

Prevention:

Participation in: Parades, Career Days,	10,000

County Fair, Equipment and Supplies:	10,000
Four (4) FIREWISE Programs	40,000
	$60,000

Education:

Fifty-two (52) home inspections annually; fire prevention seminars, educating homeowners on defensible space and what they should do in case of a wildfire: (pre attack planning).	10,000
Equipment and Supplies	10,000
	$20,000

Equipment & Supplies:

Suppression equipment and supply need:	12,000
Annual maintenance	3,000
Replacement through attrition	15,000
	$30,000

Figure 28. Weed infestation 0.5 mile southeast of Butte City along 2700 west.

Figure 29. Limited capacity bridge.
This four (4) ton weight limit bridge is located at 2400 North 2800 West intersection and one-mile north-northwest of Butte City.

Figure 30. Potential dry hydrant source 0.5 mile northeast of Butte City along 2350 N.

4.5 Howe and Antelope Road Mitigation

Howe

The Little Lost River Valley assessment area (Figure 3) is comprised mostly of single-family dwellings buffered by agricultural lands and livestock confinement operations or feedlots immediately north and east of Howe and large ranch holdings on the upper end of the valley. A couple of single-family dwellings occur along the wildland-urban interface. Sagebrush-grassland fuels present the most hazardous fuel conditions at the interface; however, as the home in Figure 31 demonstrates, good defensible space is possible. Weed infested, stubble and fallow fields nearer to Howe present the greatest fuel hazard to structures in this area. The assessed portion of the valley within Butte County has no fire protection. As noted earlier in this report, the INEEL maintains a Cooperative Fire Protection Agreements and MOU with Butte County and would respond to a fire in Howe if manpower were available.

Figure 31. Single-family dwelling along the Little Lost River Valley Highway.
This home is 1.5 miles northwest of Howe and shows good defensible space, metal roofs, and landscaping 30 feet beyond structures.

Figure 32. Potential dry hydrant location at Warm Springs Creek.
This creek is 10.5 miles northwest of Howe where the Little Lost River Valley Road intersects the creek.

Figure 33. Potential dry hydrant location on Wet Creek
This site is located approximately 33 miles northwest of Howe.

Figure 34. Potential dry hydrant location near Pass Creek Summit.

Recommended Mitigations for Howe and Antelope Road

Howe

1. Install a dry hydrant system and/or drafting area for engines and tenders along the Little Lost River Highway at three locations (see Figure 3 – assessment area and Figures 32, 33, and 34). The cost is estimated at $750 to $1000 per hydrant including contractor labor and machine costs, 6 inch schedule 40 PVC pipe, a commercially made screen, and hydrant connector (Pohlman et al. 2003).

   Environmental Effects – Potential impact to riparian landowner. Establish a land use agreement(s) between the landowner and the LRFPD. If required, obtain application/permit for dry fire hydrant from state and/or federal agency and county zoning coordinator. Check locations for suitability, such as, water depth, composition of streambed or lake bottom, ease of digging, protection of hydrant during winter.

2. Cooperate with landowners to allow access to irrigation mainline valves. This would require a 3-4 inch valve with a fire hose connection adapted to the valve to be used with tenders and engines.

3. Purchase two water tenders complete with drop tanks and shuttle capability. These tenders would be strategically located to serve rural residents east and north of Howe and utilize dry hydrants and/or mainline valves.

4. Remove hazardous fuels using a mower or blade behind a tractor once prior to curing, or preferably up to three times during summer through fall months. Depending on the road, mow or blade the surface between the edge of road and fence line parallel to the road.

   Treat the following roads located north and east of Howe:

   - 3400N to 1300W = 3.0 miles
   - 3700N to 1300W = 3.5 miles
   - 3800N to 1300W = 4.0 miles
   - 3900N to 1300W = 5.0 miles

   Total 15.5 miles

   - Along 1300W = 3.0 miles
   - Along 1400W = 2.0 miles
   - Along 1500W = 4.0 miles
   - Along 1600W = 3.0 miles
   - Along 1700W = 3.0 miles

   Total 15.0 miles

   The costs are estimated at $75 to $100 per linear mile including tractor/mower/brush hog and operator (personal communication, Mel Ellwein, Ramshorn Ranch).

5. Upgrade the community service infrastructure (all costs per Raft River Fire Protection District Communities at Risk Program Costing 2001).

   Infrastructure Needs/Costs

Construct a fire station within Howe city limits	$260,000
Install a computer system	$5,000
Purchase a heavy brush truck	$85,000
Purchase two shuttle water tenders	$30,000
Total	**$380,000**

   Program Needs/Costs

Volunteer Training	$10,000
Fire-Wise Program	$10,000
Fire Prevention	$10,000
Fire Education	$10,000
Equipment and Supplies	$5,000
Total	**$45,000**

Antelope Road

Lost River Fire Protection District protection extends only to the Custer County line 2.6 miles west on the Antelope Road (Figure 9). Although two single-family dwellings extend outside this boundary they remain within the protection zone. An additional 18.5 miles of road, or up to the Medicine Rock Equestrian Center, was assessed and considered unprotected. Other information for the area was compiled from interviews with the Arco Natural Resource Conservation Service personnel and landowners residing in the area.

Agricultural lands buffer most single-family dwellings on the lower end of the Antelope Road and to the Custer County line (Figure 35). Beginning at the Custer/Butte County line and continuing up the road to at least the Medicine Rock Equestrian Center, sagebrush-grassland becomes the primary hazardous fuel found along the interface (Figures 36 and 37).

1. Form a separate Fire District (or be part of the County-wide fire protection district mentioned in section 4.1).

2. Install a dry hydrant system and/or drafting area for engines and tenders at the location identified in Figure 3 and seen in Figure 38. The cost is estimated at $750 to $1000 per hydrant including contractor labor and machine costs, 6 inch schedule 40 PVC pipe, a commercially made screen, and hydrant connector (Pohlman et al. 2003).

   Environmental Effects – Potential impact to riparian landowner. Establish a land use agreement(s) between the landowner and the LRFPD. If required, obtain application/permit for dry fire hydrant from state and/or federal agency and county zoning coordinator. Check locations for suitability, such as, water depth, composition of streambed or lake bottom, ease of digging, protection of hydrant during winter.

3. Cooperate with landowners to allow access to irrigation mainline valves. This would require a 3-4 inch valve with a fire hose connection adapted to the valve to be used with tenders and engines.

4. Mow hazardous fuels along Antelope Road for approximately 3 miles to the Custer County line. It is recommended that this be completed once or twice during summer through fall months.
   - Cost - $75 to $100 per linear mile including tractor/mower/brush hog and operator (personal communication, Mel Ellwein, Ramshorn Ranch).

5. Plan and implement a strategy to encourage Antelope Road residents to create neighborhood-wide, fire-adapted landscapes. Residents would need to become familiar with FIREWISE practices though education and outreach programs (Hodgson 2001).
   - Cost - $100 per single-family dwelling including educational materials

6. Encourage Antelope Road residents to create defensible space by practicing any one or all of the following:

Homes and outbuildings:

- Water or "greenup" lawn areas
- Pave or gravel driveways
- Mow vegetation or disk/blade ground to bare, mineral soil out to a minimum of 50 feet
- Remove and/or reduce vegetation immediately around buildings

Practice the "zone" approach (Simmerman et al. 1989) -

- Clean zone – 0-3 feet from buildings, remove all combustibles (i.e. decorative bark or shrubs, stack firewood uphill or contour away from building.
- Short surface fuels – 3-30 feet from buildings, keep grass, and all other low plants short, < 3 inches high. Isolate trees so no branches overhang roofs.
- Tall surface fuels – 30-100 feet from buildings, uncut grasses, scattered patches of medium shrubs is acceptable, however, keep all plants less than 18 inches high.
- Tree and tall shrub thinning and pruning – For 100 feet around all buildings, thin (remove) trees and large shrubs so there is 10 feet of open space between all crowns and tops of plants. Remove the lower branches of all trees to a minimum of 10 feet above the ground. Scattered, isolated trees may be left unpruned for landscape purposes.
- Recommend the use of noncombustible roofing materials, replace wood shingles, or apply SHINGLE SAFE Fire Retardant on wood shake shingles.

Figure 35. Crested wheatgrass along Antelope Creek Road.
Photo taken one-half mile west of Highway 93 looking southwest along side of road.

Figure 36. Single-family dwelling 15 miles west of Antelope Creek Road.
This home has substantial sagebrush-grassland vegetation within 30 feet of structure. Cheatgrass and rabbitbrush fuels are also along the edge of road and interspersed with sagebrush.

Figure 37. Hazardous fuel loads along Antelope Road 12.5 miles west of Highway 93.

Figure 38. Potential dry hydrant located 4.0 miles southwest of Highway 93.